

Programme Specification and Curriculum Map for *MSc Telecommunications Engineering*



1. Programme title	Telecommunications Engineering
2. Awarding institution	Middlesex University
3. Teaching institution	Middlesex University
4. Programme accredited by	
5. Final qualification	Masters Degree, PGDip, PGCert
6. Academic year	2014/15
7. Language of study	English
8. Mode of study	Full time/Part time

9. Criteria for admission to the programme

A minimum of a lower second-class Honours degree (UK), or an equivalent overseas qualification in Computer Science or in a Science or Engineering subject. Candidates with other degrees but with relevant work experience will also be considered and are encouraged to apply.

International students whose first language is not English or who have not been taught in the English medium throughout must achieve an IELTS score of 6.5 or TOEFL 575 (paper based) 233 (computer based).

10. Aims of the programme

The programme aims to:

- Provide students with the skills that enable them to develop their competence in related fields such as networks and management
- Provide the knowledge necessary to critically evaluate and analyse new developments in telecommunication industry
- Enable currently practicing Engineers and Scientists to renew their qualifications and learn new technologies in the fields of telecommunication and computer networks.
- A balance of theory, advanced practical skills and experience to enable students to develop a sound knowledge and analytical ability to facilitate their intellectual and professional development
- Demonstrate an awareness and understanding of professional, ethical and social issues and show respect for diversity and global issues.

11. Programme outcomes

A. Knowledge and Understanding

On completion of this programme the successful student will be able to demonstrate a systematic understanding of the knowledge of the domain of their programme of study, with depth being achieved in particular areas such as :

1. Theoretical and practical knowledge of telecommunications systems,
2. Design and implementation of telecommunication systems
3. Different tools to evaluate systems in telecommunication environments
4. Advance concepts of mobile communication systems and services
5. Advance concepts of digital communication systems
6. Current technologies related to transmission, switching and signalling
7. Communication protocols
8. Design and implementation issues of effective security strategies to minimise the effects of attacks

Teaching/learning methods

Students gain knowledge and understanding through

- Traditional lecture delivery (outcomes 1-8),
- Group and individual research, presentations and written reports (outcomes 1-8),
- Laboratory sessions (outcome 2, 3, and 8),
- Individual and group design work (outcomes 3, 4, 5, and 8),
- Individual project. Throughout the student is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject (outcomes 1-8).

Assessment

Students' knowledge and understanding is assessed by

- Outcomes 1-2 and 4-7 assessed by examination.
- Outcomes 3 and 6 are assessed by laboratory sessions and practical assignments
- Outcome 1-8 are assessed by individual essay and final project thesis.

B. Cognitive (thinking) skills

On completion of this programme the successful student will be able to:

1. Devise solutions to a variety of technical problems related to telecommunication systems
2. Use mathematical tools to analyse telecommunication systems competently
3. Assemble and test communication systems and be able to measure parameters to analyse the performance of such systems
4. Analyse systems, identify internetworking problems and effectively apply solutions and tradeoffs.
5. Use different research methods to develop policies and select suitable mechanisms to enforce such policies
6. Ensure that telecommunication system design complies with relevant professional, ethical and legal issues.

Teaching/learning methods

Students learn cognitive skills through self directed, resource based learning, small group discussions, small group and individual exercises, laboratory sessions, demonstration software, on-line examples and research project. Weekly seminar sessions provide students with the opportunity to address questions, queries and problems.

- Traditional lecture delivery (outcomes 1-6)
- Group and individual research, presentations and written reports (outcomes 1,5, and 6)
- Laboratory sessions (outcome 1, 2, 3)
- Individual and group design work (outcomes 3, 4, 5, and 7)
- Individual project. Throughout the student is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject (outcomes 1-6).

Assessment

Students' cognitive skills are assessed by Group and individual coursework, presentations, group and individual reports.

- Outcomes 1-2 & 4-6 assessed by examination.
- Outcomes 3 and 6 are assessed by laboratory sessions and practical assignments
- Outcomes 1-6 are assessed by individual essay and final project thesis.

C. Practical skills

On completion of the programme the successful student will be able to:

Demonstrate the ability to apply the principles and practices of the discipline in tackling a significant technical problem; the solution should demonstrate a sound justification for the approach adopted as well as a self-critical evaluation of effectiveness but also a sense of vision about the direction of developments in aspects of the discipline:

1. Build telecommunication systems to find a solution for a specific task
2. Critically evaluate the needs for security provisions for communication networks and apply policies and regulations for existing telecommunication systems
3. Have a critical and clear understanding of current theories and techniques for appraising user interfaces and practical design skills for effective user interactions
4. Critically analyse and evaluate security application for existing telecommunication systems
5. Make informed decisions on appropriate measures to improve existing telecommunication systems in work place
6. Demonstrate management skills and techniques in project leadership
7. Draw up security measures for communication networks and telecommunication systems.

Teaching/learning methods

Students learn practical skills through

- traditional lecture delivery (outcomes 1 and 3),
- group and individual research, presentations and written reports (outcomes 1-7),
- small group and individual exercises (outcomes 1-7),
- laboratory sessions (outcome 6 and 7),
- Individual project (outcomes 1-7: depending on project title).

Analysis, design and problem solving skills are further developed through various design activities as well as case studies, and extensive computer laboratory sessions. Feedback is given to students on all assessed coursework as well as written exams (in the form of exam reports produced each semester).

Assessment Method

Students' practical skills are assessed by

- group and individual coursework (outcomes 1-6)
- laboratory tests (outcome 6 and 7),
- the unseen examination (outcomes 1, 3, 6 and 7), and
- The project thesis (outcomes 1-7 depending on project title).

D. Graduate Skills

On completion of this programme the successful student will be able to:

1. Acquire and apply relevant mathematical techniques
2. Analyse a problem systematically and implement effective solutions both individually and within a group
3. Communicate effectively with peers and senior managers in writing, verbally and through graphical notations
4. Apply knowledge gained to secure telecommunication systems environments
5. Effectively manage resources and time and share information with peers
6. Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry
7. Learn effectively for the purpose of continuing professional development in a wider context

Teaching/learning methods

Students acquire graduate skills through the teaching and learning programme outlined above. These skills are also nurtured through:

- small group and individual presentations and exercises (outcome 1-4),
- laboratory sessions (outcomes 2-4, and 6)
- the individual project (outcomes 1, and 3-7)

Assessment method

Students' graduate skills are assessed by coursework reports and the thesis report.

- Skills 1-7 are assessed through coursework and written exam (seminars)
- Skills 2-4 and 6 are assessed by laboratory sessions.

12. Programme structure (levels, modules, credits and progression requirements)

12. 1 Overall structure of the programme

The programme is designed as a full-time and a part-time course including industrial placement where applicable. The normal University year is split into three terms of approximately 12 weeks each and students can start the programme in either Autumn term (October) or winter term (January).

The programme conforms to the requirements of the Academic Learning Framework of Middlesex University and comprises seven taught modules (four worth 15cps, three worth 30cps, and one with no credit) and a final project module (worth 60cps). Each 15cps and 30cps module involves approximately 90 and 180 hours of study respectively. This includes attendance at lectures, tutorials, laboratory activities and study at home or in industry. All modules on the programme are compulsory.

1. Full-time students joining the programme in October pursue the following study schedule:

- ❖ Six modules (totalling 120cps) for Autumn Term start (Oct/Jan)
- ❖ One research skill module (0 cps) for Autumn/Winter terms (weeks 6 to 18)
- ❖ Postgraduate project module (60cp) in the Summer Term

Students who enrol in September may be able to complete their project over the following Spring term, thereby completing the programme in one year.

2. Full-time students joining the programme in January pursue the following study schedule:

- ❖ Six modules (totalling 120cps) For Winter start Term (January)
- ❖ One research skill module (0 cps) for Winter/Spring terms (weeks 6 to 18)
- ❖ Undertake the postgraduate project module (60cp) in the Autumn Term

Students who enrol in January may be able to complete their project over the following Autumn, thereby completing the programme in one year.

3. Part-time students joining the programme in September/January pursue the following study schedule:

- ❖ One module (30cps) in the Autumn Term of the 1st year
- ❖ Two modules (30cps) in the Autumn Term of the 1st year
- ❖ One module (30cps) in the Autumn Term of the 2nd year

- ❖ Two modules (30cps) in the Autumn Term of the 2nd year
- ❖ One research skill module (0 cps) for Autumn/Winter terms (weeks 6 to 18) of 2nd year
- ❖ Postgraduate project module (60cp) in the Spring and Autumn Terms of the 2nd year

Students must successfully complete all the modules of the taught part of the programme including Research Skills module before they can register for the Project Module.

The duration of postgraduate project is one term for full-time and two terms for part-time students.

Examinations for taught modules take place at the end of the Winter and Spring Terms only, with a reassessment opportunity before the start of the Autumn Term. There are no written examinations at the end of the Autumn Term.

Projects should be appropriate to the Programme studied and supervised accordingly. All project proposals must be approved by the Programme Leader or a member of the academic team delegated by the Programme Leader. Details of each module can be found on UniHub or in the Science and Technology Subject Handbook.

12.2 Levels and modules

Level 7

COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
<i>Students must take all of the following:</i> CCE 4300 CCE 4810 CCE 4820 CCE 4830 CCE 4840 CCE 4850 CCE 4900 CCE 4910	<i>Students must also choose <u>ONE</u> from the following:</i> NONE	<i>Students must pass all taught modules before they can progress to the dissertation stage</i> <i>To pass modules students must pass all components of assessments (examinations and coursework Components)</i>

12.3 Non-compensatable modules (note statement in 12.2 regarding FHEQ levels)

Module Level	Module Code
Level 7	CCM4900
Level 7	CCE4910

13. A curriculum map for Telecommunications Engineering

This section shows the highest level at which programme outcomes are to be achieved by all graduates, and maps programme learning outcomes against the modules in which they are assessed.

Programme learning outcomes

Knowledge and understanding		Practical skills	
A1	Theoretical and practical knowledge of telecommunications systems associated with LANs, MANs, and WANs	C1	Build telecommunication systems to find a solution for a specific task
A2	Acquire and apply relevant mathematical techniques	C2	Critically evaluate the needs for security provisions for communication networks and apply policies and regulations for existing telecommunication systems
A3	Design and implementation of telecommunication systems	C3	Have a critical and clear understanding of current theories and techniques for appraising user interfaces and practical design skills for effective user interactions
A4	Different tools to evaluate systems in telecommunication environments	C4	Critically analyse and evaluate security application for existing telecommunication systems
A5	Advance concepts of mobile communication systems and services	C5	Make informed decisions on appropriate measures to improve existing telecommunication systems in work place
A6	Advance concepts of digital communication systems	C6	Demonstrate management skills and techniques in project leadership
A7	Current technologies related to transmission, switching and signalling Communication protocols	C7	Draw up security measures for communication networks and telecommunication systems.
A8	Design and implementation issues of effective security strategies to minimise the effects of attacks		

Cognitive skills		Graduate Skills	
B1	1. Devise solutions to a variety of technical problems related to telecommunication systems	D1	Acquire and apply relevant mathematical techniques
B2	Use mathematical tools to analyse telecommunication systems competently	D2	Analyse a problem systematically and implement effective solutions both individually and within a group
B3	Assemble and test communication systems and be able to measure parameters to analyse the performance of such systems	D3	Communicate effectively with peers and senior managers in writing, verbally and through graphical notations
B4	Analyse systems, identify in internetworking problems and effectively apply solutions and trade-offs	D4	Apply learnt knowledge in internetworking to better protect telecommunication systems environments
B5	Use different research methods to develop policies and select suitable mechanisms to enforce such policies	D5	Effectively manage resources and time and share information with peers
B6	Ensure that telecommunication system design complies with relevant professional, ethical and legal issues.	D6	Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry
		D7	Learn effectively for the purpose of continuing professional development in a wider context

Module Title	Module Code by Level	Programme outcomes																											
		A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	B 1	B 2	B 3	B 4	B 5	B 6	C 1	C 2	C 3	C 4	C 5	C 6	C 7	D 1	D 2	D 3	D 4	D 5	D 6	D 7
Computer Networks and Internetworking	CCE4300	✓		✓	✓		✓	✓				✓	✓	✓		✓		✓		✓				✓	✓	✓	✓	✓	✓
Data Communications and Information Theory	CCE4810	✓						✓				✓						✓		✓			✓	✓					
Digital Transmission Systems	CCE4820	✓	✓		✓	✓	✓			✓	✓		✓			✓		✓			✓		✓	✓	✓		✓	✓	
Mobile Communications	CCE4830	✓		✓		✓				✓	✓					✓				✓					✓		✓	✓	
Broadband Technologies and Fibre Optics	CCE4840			✓		✓		✓				✓				✓		✓		✓				✓				✓	
Telecommunications Security	CCE4850		✓		✓				✓						✓		✓		✓			✓						✓	
Project Research and Communication skills	CCE4900	✓												✓							✓				✓		✓	✓	
Postgraduate Project in Communications	CCE4910				✓					✓			✓		✓					✓	✓			✓	✓			✓	

14. Information about assessment regulations

Information on how the university formal assessment regulations work, including details of how award classifications are determined, can be found in the University Guide and Regulations at www.mdx.ac.uk/regulations/.

Modules are assessed in accordance with the School of Science and Technology's assessment strategy.

Practical aspects of the programme may be assessed by laboratory assignments, lab tests and coursework tasks.

Theoretical material is normally assessed by coursework and examinations.

Grades are awarded on the standard University scale of 1-20, with Grade 1 being the highest. To pass a taught module, the two main components: coursework (incl. laboratory work) and examination must be passed individually.

15. Placement opportunities, requirements and support (if applicable)

Careers

You can call in at any of the campus Career centres or attend workshops and seminars throughout the year. You can conduct your own research through on-line computer programs (ask at the Learning Resource Centre (or library) counter) and in the careers libraries, which contain occupational information, employers' vacancies and recruitment literature as well as details about further study options.

There are also opportunities for you to be linked with a graduate of the University who will act as your mentor in your intended area of work. And you can meet a wide range of employers from the region at campus-based careers fairs.

You are encouraged to link your studies to paid or unpaid work experience in various ways:

- You can get help finding part-time or vacation work by registering with JobsPlus Online, the student employment website at: <http://unihub.mdx.ac.uk/Employability/index.aspx>
- There are many opportunities for you to engage in voluntary work, which will enhance your CV and give you additional learning opportunities as well as putting something back into the community. For opportunities to volunteer in the local community and gain an award certificate, contact the Community Volunteering Unit (volunteering@mdx.ac.uk, 020 8411 6398, staff contact: Helen O'Donnell). For opportunities to be a mentor or tutor working in local secondary schools contact the Student Associates

Scheme (sas@mdx.ac.uk, 020 8411 6385, staff contacts: Jacqui Irven and Jacqui Waterhouse)

Work experience is one of the most valuable assets you can have in planning a successful career, giving you the chance to undertake work directly related to your Programme of study.

Careers Advisers help you to plan your academic programme and personal development in relation to your career goals assisting you with self-awareness, decision-making, career options and postgraduate study. Your future earnings potential may depend on your making an appointment with an Adviser sooner rather than later.

Placements

Work placements are supported across the University by a network of placement offices.

Work experience is one of the most valuable assets you can have in planning a successful career. Placement is a standard part of many programmes and a possibility on many others, giving you the chance to undertake work directly related to your programme of study.

Employers want people who have developed the ability to be flexible and adaptable, work in teams, communicate with fellow employees and customers, take initiatives and responsibility and, when necessary, take the lead. Many of these qualities can be learned and developed through placements.

Equally important is the fact that these experiences help you develop your own ideas about the career you want, what will suit you best, and perhaps the kind of work or employers you wish to avoid. It is much easier to identify the positive and negative aspects of a particular career if you have experienced it first hand.

The University has responsibilities under the Health and Safety at Work Act 1974 to ensure that risks to health and safety are properly controlled. On placement you have the same health and safety responsibilities as any other employee in the workplace and you must take reasonable care of your own health and safety and those of other people.

It is therefore essential that no student commences a placement without first having it approved by the Placement Service and as such ensuring that all administrative, health and safety and insurance procedures are carried out prior to the start date. Failure to adhere to this may invalidate your placement.

Further information and guidance notes for students on work placements are available on <http://unihub.mdx.ac.uk/Employability/index.aspx>

- Industrial placement is an option available for students who wish to work in industry for a maximum period of 12 weeks. During this period students are expected to work on their project, part of which should be relevant to the company where the placement is arranged.
- Industrial placement is conditional on the successful completion of all taught modules. Therefore 120 credits at level four need to be successfully completed before embarking on an industrial placement.
- The campus Placement Office manages University-industry relations and assists students in obtaining industrial placements. Further information on placement opportunities can be obtained there. Students are visited by an academic from the programme team at least once.

Postgraduate placements are normally a student initiated process for which the University will provide support.

16. Future careers (if applicable)

Graduates of this programme will become:

Technologists, Engineers, and managers in high-growth sectors such as electronics, electronic information systems, network engineers, telecommunications, and info-communications and Media engineers. Students will also be well placed to find employment in fields such as network administration, network management, and education.

17. Particular support for learning (if applicable)

You are expected to be independent and to take responsibility for your own academic and personal life. However there is a lot of help available.

Your tutors will direct your studies and ensure that you know what work you need to cover in any given module. Seek advice from academic staff either after class, during their office hours (published on their doors) or by email or telephone.

General educational guidance, clarification of University Regulations and help with planning your programme is available from the student support team's duty advisers, who can be contacted by telephone or email or in person on any campus and who normally have regular drop-in hours.

You can get a wide range of support, advice and information direct from the student website unihub (<http://unihub.mdx.ac.uk/>) where you can also find the

telephone numbers and email addresses of student support team staff. If you need personal advice call the Campus Student Office *Insert email and hunt number for Student office of relevant campus (or campuses)*. If they cannot help you, they will refer you to someone who can.

Do not hesitate to approach the student support team by telephone, email or in person for support services including:

- Fee payments
- Money, legal, practical welfare advice
- Financial management and debt counselling
- Changes to your personal record (address, name, etc.)
- Using MISIS (Middlesex Integrated Student Information System)
- Programme regulations advice
- Revising or recording module registrations
- Letters to landlords, banks and employers
- Council tax exemption certificates
- Submission of coursework
- Assessment deferral requests
- Recording extenuating circumstances
- Recording reasons for unavoidably being absent
- Arranging to interrupt your studies, change or withdraw from your programme
- Advice on where to make a suggestion or a complaint
- International student support – social events and practical help
- Personal Counselling

Specialist advice is also available from the Disability Support Service, Careers Advice and Placement Services, Accommodation Service, Childcare Service, and Sport and Leisure; and from the Middlesex University Students' Union (MUSU). For further information contact Sobia Hussein: 020 84114945 at the Disability Support Service please email: disability@mdx.ac.uk

18. JACS code (or other relevant coding system)	
19. Relevant QAA subject benchmark group(s)	Networking and Communication Engineering

20. Reference Points
<p>The following reference points were used in designing and reviewing the programme:</p> <ul style="list-style-type: none"> • QAA Framework for Higher Education Qualification in England, Wales and Northern Ireland • QAA Computing subject benchmarks • Towards Benchmarking Standards for Taught Masters Degrees in

Computing (sponsored by CPHC), May 2004

- QAA/QAAS guidelines for programme specification
- QAA Code of Practice for the assurance of academic quality and standards in HE
- University' Policy, Regulations and guidelines
- Middlesex University and School of Engineering and Information Sciences Teaching Learning and Assessment policies and strategies

21. Other information

The group is active in research in computer networks, network security, distributed systems, performance evaluation, and telecommunications. In recent years, academics and research students have been actively publishing their research findings. This work includes quality of Service in Mobile communications, wired/wireless networks, authentication standards (e.g. Kerberos variants), cryptography, access control mechanisms, IPSec and wireless network security, performance evaluation of complex systems, and telecommunications.

Please note programme specifications provide a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve if s/he takes full advantage of the learning opportunities that are provided. More detailed information about the programme can be found in the programme handbook and the University Regulations.